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| JOLLEY, KIRSTEN | |

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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application Number: 10/085,527
Filing Date: February 28, 2002
Appellant(s): DOPPER, GEBHARD

John P. Musone
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed April 21, 2005 appealing from the Office action mailed June 15, 2004.

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**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection is correct.

**(7) Claims Appendix**

A correct copy of appealed claims 1-24 appears on pages 7-9 of the Appendix to the appellant's brief. However, claim 25 is missing. Accordingly, claim 25 is written in the Appendix to the Examiner's Answer.

**(8) Evidence Relied Upon**

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

| | |
|---|---|
| US-5520516 | Taylor et al. |
| US-Re 35611 | McComas et al. |
| US-6096132 | Kaiba et al. |

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-10 and 12-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In line 11 of claim 1, the phrase "controlling a plurality of spray parameters *of the ceramic coating*... [emphasis added]" is new matter because the specification does not disclose that the spray parameters of the ceramic coating are controlled, but only that the parameters of the blasting process step (prior to coating) are controlled. Because this appears to be a typographical error, the claims have been interpreted, for the purpose of examination, as requiring that the jet

parameters of the blasting step are controlled, not the parameters of the ceramic coating step.

Claims 1-10, 12-13, and 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. (US 5,520,516) alone or in view of McComas et al. (US Re. 35,611), and further in view of Kaiba et al. (US 6,096,132).

With respect to claims 1-4, 12, 18-19, 21, and 25, Taylor et al. discloses a method of applying a zirconium-based oxide ceramic coating to a metallic bond coated superalloy turbine blade tip of a gas turbine engine. Taylor et al. teaches that prior to coating, the blade tip should be roughened just prior to coating for the best bond strength (col. 3, lines 60-67). Taylor et al. teaches that the method for roughening can be abrasive grit blasting. It is noted that the tip of a turbine blade has a curved surface. Taylor et al. lacks a teaching of measuring a contour line geometry of the turbine blade tip, inputting the measured geometry into a control system, and controlling a plurality of spray parameters of the blasting system via the control system based on the geometry such that at least one of the parameters remains constant during the blasting.

It is the Examiner's position that an engineer having ordinary skill in the art would have recognized that each of the blasting distance, intensity, angle, and time would directly affect the amount and degree of roughness produced on any given area on a substrate surface during an abrasive grit blasting process. Further, it is the Examiner's position that an engineer skilled in the art would have recognized that it is desirable to perform a constant amount of roughening over the entire substrate surface in order to produce a coated surface where the coating is evenly adhered to the entire substrate

surface, thereby producing a uniform coating applied thereon. For example, if a first region of the substrate is blasted for a longer period of time or with higher intensity or at a closer distance between the blasting apparatus and surface than a second region, then one skilled in the art would expect that the first region would result in a rougher surface than that blasted for a shorter period of time or with less intensity or from a farther distance. Surfaces with different roughness would have different levels of coating adherence. Further, since a turbine blade tip is a curved surface, constant roughening would require following the contour line geometry of the curved surface. Therefore, it would have been obvious to one skilled in the art to have maintained at least one of the blasting distance, intensity, angle, or time constant along the contour of the substrate surface in order to form an even and consistently roughened surface, thus ensuring that the coating is uniformly adhered to the entire substrate surface.

Alternatively, McComas et al. is cited as further evidence that consistent and uniform blasting is known and desirable when abrading turbine jet engine components such as turbine blades. McComas et al. teaches that critical parameters of its abrading process include nozzle distance from the surface and the liquid pressure (blasting intensity) (col. 3, lines 1-8). While McComas et al. discloses the use of blasting with water on a coated surface instead of abrasive grit blasting on an uncoated surface, both processes blast material at a surface using a jet for the purpose of abrading the surface beneath, and therefore similar principles regarding blasting distance and blasting intensity would apply to both grit blasting and water jet blasting. It would have been obvious for one having ordinary skill in the art to have maintained a constant nozzle distance and

constant blasting intensity during abrasive grit blasting in the process of Taylor et al., upon seeing the reference of McComas et al., in order to uniformly roughen the surface.

It is also the Examiner's position that an engineer skilled in the art would have known of the use of automatic control systems, and that such control systems are advantageous in performing processes more efficiently and cost effectively by automating activities instead of performing them manually. It is well settled that it is not inventive to broadly provide a mechanical or automotive means to replace manual activity which has accomplished the same results. *In re Venner et al.*, 120 USPQ 192. One having ordinary skill in the art having seen the reference of Taylor et al., alone or in combination with McComas et al., would have been motivated to look to the prior art for spray systems that are capable of maintaining a uniform spray along an entire surface of a curved substrate, so that the curved blade tip of Taylor et al. may be uniformly grit blasted and coated.

Kaiba et al. is cited for its teaching of an automatic painting device for use on a substrate surface having a curved shape, where the device is capable of keeping a constant interval between the spray gun heads and the surface to be painted. Kaiba et al. teaches measuring Z axis direction displacement distances at coordinate points along the surface, inputting the measured geometry into a control system, and controlling the spraying such that the distance from the spray head to the substrate surface remains constant when traversing over the entire curved surface (col. 4-5). It would have been obvious to one having ordinary skill in the art to have performed the abrasive grit blasting step of Taylor et al. using a spray control system as taught by Kaiba et al. in order to ensure that uniform blasting is performed along the entire three-dimensional curved blade

tip surface, and also to provide an automatic blasting process thus improving efficiency. While Kaiba et al. is directed to a painting process instead of grit blasting, the control system used to control the sprayer would be similar.

As to claims 6-10, Taylor et al. teaches that the first metallic bond coating may be NiCoCrAlY, and the ceramic coating applied thereon is yttria stabilized zirconia (col. 6, lines 63-64).

As to claim 13, the apparatus of Kaiba et al. illustrates using an angle in the range of 20-90 degrees with respect to a curved surface. Alternatively, it is noted that McComas et al. teaches that blasting angle is a matter of preference, but an angle between 20-90 degrees may be used and 45 degrees is most preferred (col. 3, lines 9-22).

As to claims 5 and 20, while it is noted that Kaiba et al. does not teach that the blasting angle is maintained constant. However, it is the Examiner's position that it one skilled in the art would have recognized that different blasting angles would produce different results, specifically different degrees and locations of blasting. It would have been obvious for one having ordinary skill in the art to have maintained a constant blasting angle in the process of Taylor et al., as modified by Kaiba et al., in order to maintain a constant amount of roughening over the entire substrate surface and to produce a coated surface where the coating is evenly adhered to the entire substrate surface, thereby producing a uniform coating. Alternatively, it is noted that McComas et al. teaches that the blasting angle affects the fragment location post-blasting, and the direction helps to remove the fragments from the interaction zone thereby ensuring that they do not interfere with the blasting process (col. 3, lines 18-22). It would have been obvious to one having ordinary skill in the art to have maintained the blasting angle

constant in order to consistently remove the blasted fragments from the interaction zone since changing the angle would cause the fragments to move in a different location and thus potentially interfere with the blasting/abrading process.

**(10) Response to Argument**

With respect to the rejection of claims 1-10, 12, 13, and 18-25 under 35 USC 103(a), Applicant argues that the Examiner fails to explain why an engineer would have been motivated to measure the contour line geometry, control the spray parameters while keeping one parameter constant and seek uniform roughening. The Examiner disagrees. The Examiner provided detailed reasoning in the rejection set forth in the final Office action as to why an engineer skilled in the art would have been motivated to seek uniform roughening, and why controlling the spray parameters including keeping at least one parameter constant, as well as following the contour line geometry of the substrate, would produce uniform roughening. As discussed above, it is the Examiner's position that an engineer skilled in the art would have recognized that it is desirable to perform a constant amount of roughening over the entire substrate surface in order to produce a coated surface where the coating is evenly adhered to the entire substrate surface, thereby producing a uniform coating applied thereon. For example, if a first region of the substrate is blasted for a longer period of time or with higher intensity or at a closer distance between the blasting apparatus and surface than a second region, then one skilled in the art would expect that the first region would result in a rougher surface than that blasted for a shorter period of time or with less intensity or from a farther distance. Surfaces with different roughness would have different levels of coating adherence.

Further, since a turbine blade tip is a curved surface, constant roughening would require following the contour line geometry of the curved surface. Therefore, it would have been obvious to one skilled in the art to have maintained at least one of the blasting distance, intensity, angle, or time constant along the contour of the substrate surface in order to form an even and consistently roughened surface, thus ensuring that the coating is uniformly adhered to the entire substrate surface.

Applicant also argues that McComas, unlike Taylor, is a ceramic removal process that utilizes liquid jet blasting to remove a coating from a surface, and the McComas parameters of blasting pressure, blasting angle, and blasting time are established as not to cause damage to the underlying metal substrate surface which is inapposite, if not contradictory, with Taylor's surface roughening. The Examiner acknowledges that McComas et al. is directed to liquid jet blasting while Taylor et al. is cited for its teaching of abrasive grit blasting, and that McComas et al. intends to remove a coating while Taylor et al. roughens a substrate surface prior to coating. However, the Examiner maintains that both processes blast material on a surface of a substrate and similar principles would apply to both types of jet blasting, namely that the critical parameters such as nozzle/blasting distance, jet pressure/blasting intensity, and nozzle/blasting angle directly affect the blasting performance and results obtained.

Applicant argues that Kaiba is an automobile paint sprayer having fixed spray heads that travel in the X, Y and Z directions relative to a stationary automobile whereas Applicant's claimed invention teaches surface roughening of a metal component using a grit blasting device having motion in the X and Y directions and a blast head capable of rotating in the X-Y plane relative to a metal component. Applicant states that because of

the fixed blasting angle, Kaiba cannot allow control of the spray head to ensure a blasting angle along a curved surface. The Examiner notes that the independent claims do not require that a particular blasting angle is maintained relative to the curved surface. The only claim that requires a particular blasting angle is claim 13, which allows for a blasting angle of 90° -- the angle taught by the Kaiba et al. reference (see Figure 1 of Kaiba et al.).

Appellant argues that the Examiner offers no proper motivation from the prior art that would lead one of ordinary skill in this field to make the proposed combination. The Examiner disagrees and provided detailed motivation, as discussed in the grounds of rejection above.

With respect to the rejection of claims 1-10, 12, and 13 under 35 USC 112, first paragraph, Appellant states that claims 1-10, 12, and 13 were amended in the amendment after final which was not entered by the Examiner. The Examiner notes that the after final amendment of April 1, 2004 contained substantial new proposed amendments to the claims in addition to replacing "the ceramic coating" with <u>a jet spray</u> in claim 1, line 14. Such an amendment correcting only the above phrase would have been accepted.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Kirsten C. Jolley

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PRIMARY EXAMINER

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APPENDIX – Appealed Claim Excluded from Appeal Brief Appendix

25. The method as claimed in claim 18, wherein the spray parameters include: a blasting distance, a blasting intensity, a blasting angle and a blasting time.